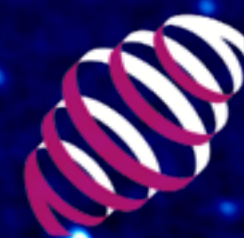


LOFAR Calibration & Imaging Tiger Team



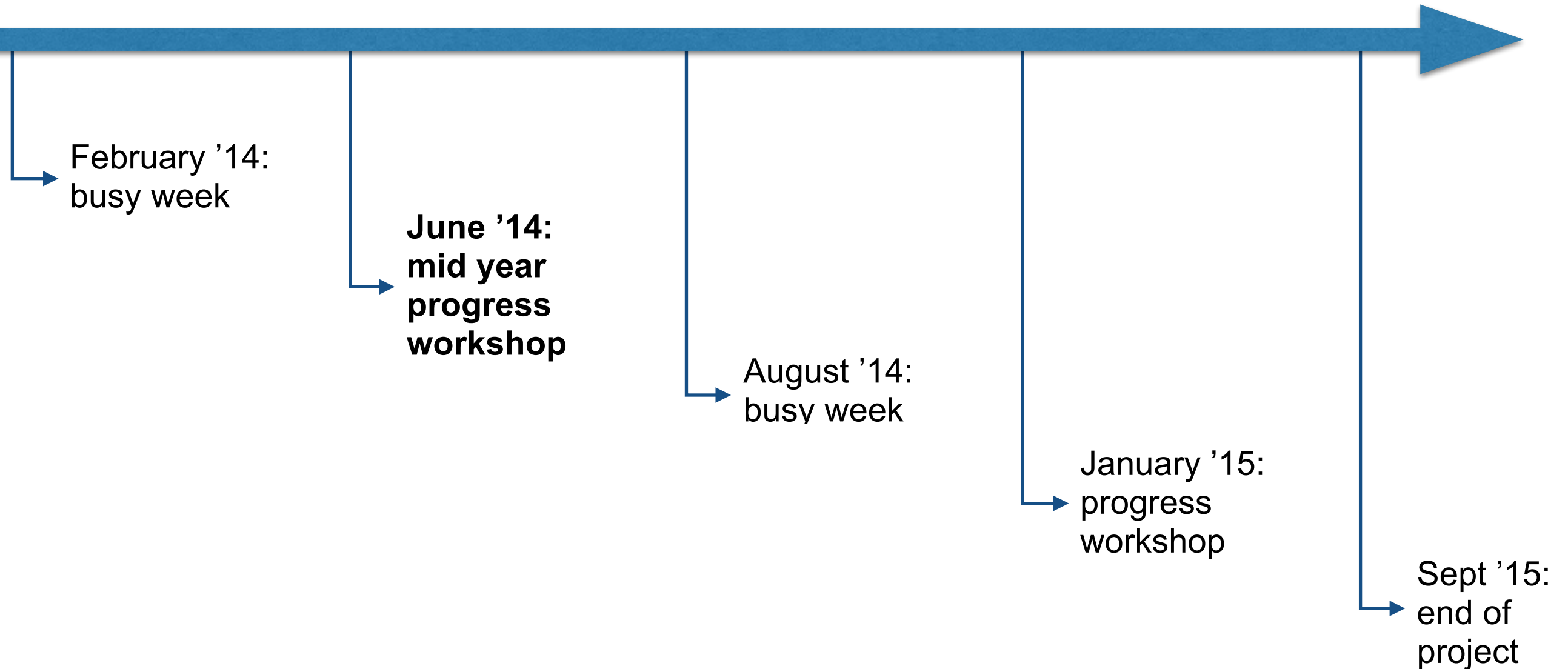
Tammo Jan Dijkema
LSM 9 July 2014



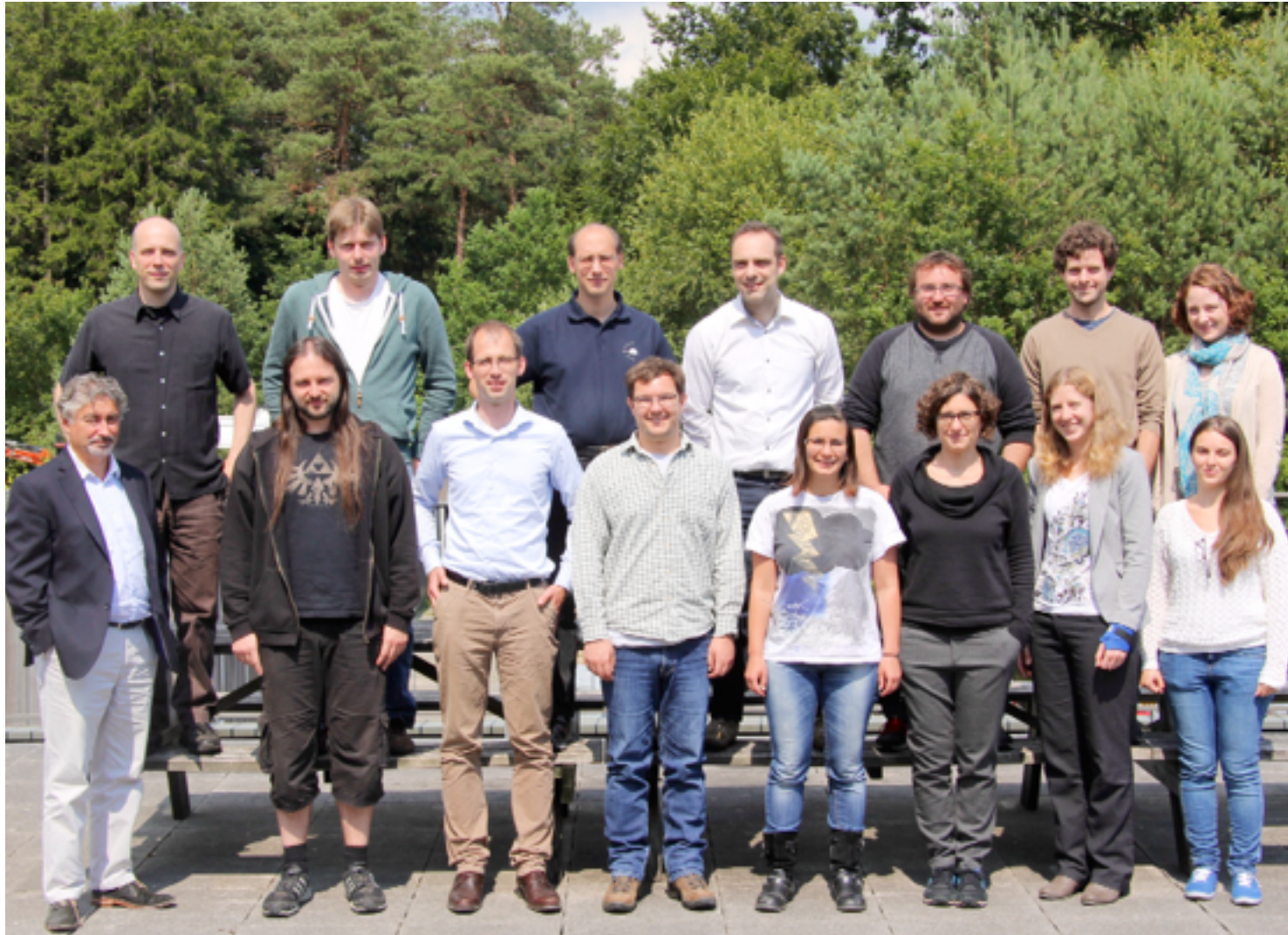
Project timeline



ASTRON



Mid year progress workshop



CITT Mid-2014 Progress Workshop Schedule
v4, 24 June 2014
Hooghoudt kamer, ASTRON

Thursday, 26 June 2014

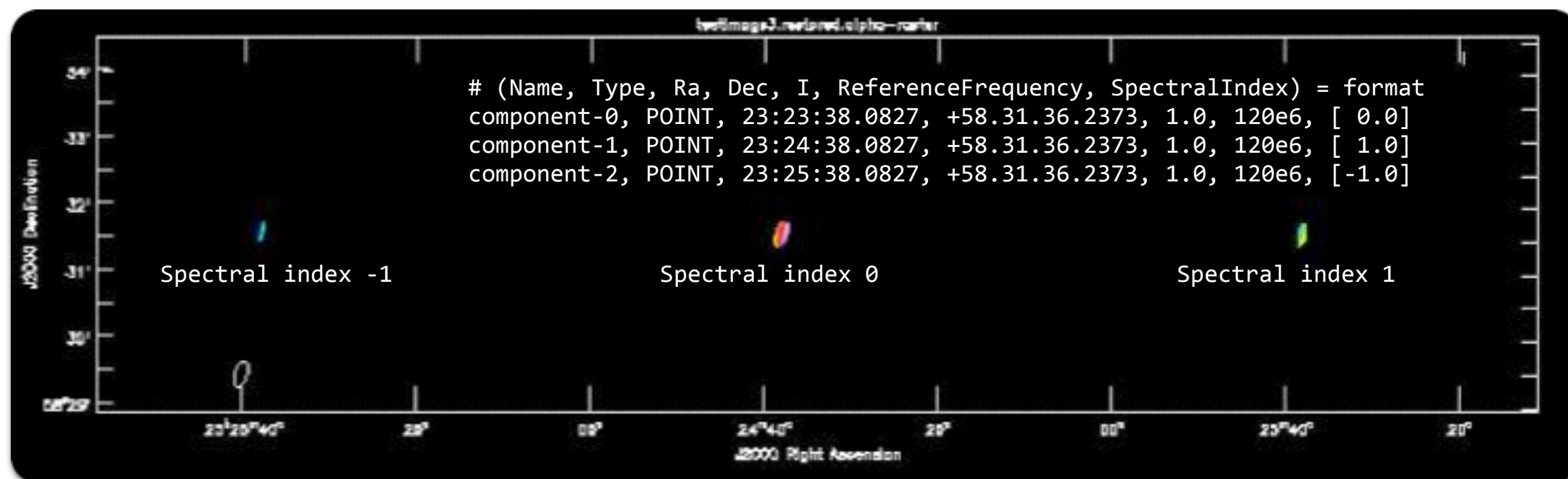
Session I: Background, Overview, and Timeline		
9:00 - 9:05	Mike Garrett	Welcome address
9:05 - 9:30	George Heald	Project scope and priorities
9:30 - 10:00	Francesco De Gasperin	Current state of the art beyond SIP (remote)
10:00 - 10:30	all	Discussion: Next steps for SIP, essential enhancements
10:30 - 11:00		Coffee break
Session II: Low level software tools		
11:00 - 11:20	Tammo Jan Dijkema	Calibration in BBS and NDPPP
11:20 - 11:45	Tammo Jan Dijkema	Overview of test results from NDPPP
11:45 - 12:05	Bas van der Tol	Imaging with the awimager
12:05 - 12:30	Bas van der Tol	Overview of test results from awimager
12:30 - 13:30		Lunch break
Session III: High level software tools		
13:30 - 13:50	Nicolas Vilchez	Self-calibration in the SIP
13:50 - 14:15	Nicolas Vilchez	Overview of test results from selfcal
14:15 - 14:35	David Rafferty	Direction-dependent calibration and correction using TEC screens
14:35 - 15:00	David Rafferty	Overview of test results from ionospheric calibration
15:00 - 15:30		Coffee break
Session IV: Priorities and Timeline		
15:30 - 17:00	all	Discussion: <ul style="list-style-type: none">- Convergence of research threads into integrated SIP- Ordering of priorities- Timeline analysis- Reassessment of the critical path- Connection to the RO: timescales for operational capabilities
17:00		End of workshop

Goals:
mark half way point
reconsider timeline and priorities

- Imager
- Calibration
- Selfcal
- Ionosphere

▪ **Done:**

- We have a working „AWImager v2” (on a branch)
- Wide band imaging works: plot of recovered spectral index



- Works with current casa releases (4.2 or trunk)
- Vastly cleaned up code
 - Friendlier parset interface
 - Maintainable, easier development
 - More modular

- **In progress:**

- Interfaces of imager for other programmers
 - Plug in your own beam
 - Plug in a fast imaging algorithm (GPU, ...)
- Improve multithreading performance
- Integrate imager into the LOFAR software
 - Changes being made to casacore, casarest, casa

- **Longer term:**

- Multi-node imager
 - Faster
 - Works around memory limits
 - Easier to schedule

- **Done:**

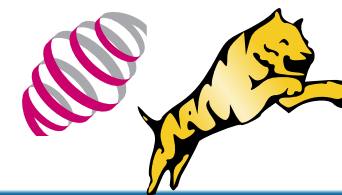
- We have fast gain calibration in NDPPP (on a branch)
 - Full Jones, phase only or diagonal
 - Beam can be applied
- Speedups of over factor 50 achieved in some cases
 - Small memory footprint, so easy to run 24 NDPPP jobs
- Tests: solutions were the same as the ones from BBS and NDPPP calibration was faster

- **In progress:**

- Missing features: Solint, Scalar Phase, read model data
- Better SNR by using a sliding window

- **Longer term:**

- Direction dependent scheme



▪ **Done:**

- Selfcal standalone tool works (in LofIm, on Flits and CEP)
- Works on LBA, HBA Low, HBA High
- Good results in most cases

Tested by Ilse, Marisa,
Annalisa, Leith, Marco,
Martin, Elizabeth, John,
Raymond, Rosita,
Sarrvesh, Aleksandar,
Carmen, ...

Source Name	frequency	best resol got?	resol	baseline	rms noise	Thermal noise	ratio	Flux observed	Dynamic range
3C244	60MHz	no	40"	10km	35mJy	3.6mJy	10.0	50Jy	1500
3C244	151MHz	yes	5"	80km	1.35mJy	0.14mJy	10.0	22Jy	18500
J1431+1331	125-180MHz	yes	5"	80km	1.2mJy	0.2mJy	6.0	1.82Jy	2000
B2 0924+30	125-180MHz	no	10"	~15km	1.2mJy	0.2mJy	6.0	diffuse	
COMA	140MHz	no							
M82	127MHz	yes	6"	80km	4.8mJy	0.85mJy	5.8		3500
M82	130MHz	yes	6"	80km	4.3mJy	0.85mJy	5.05		3800
blank field	HBA	no	25"	~20km				3Cxxx sources	high
H224+10	147.3MHz	yes	48"	~10km	4.3mJy	1.12mJy	3.8	4.55	790
NGC3627	125.6MHz	no	30"	~20km	10mJy	0.2mJy	50.0	2.71Jy	270
3C452	146MHz	yes	4.8"	~100km	2mJy	0.3mJy	6.0	71Jy	39250
3C388	143MHz	yes	4"	~120km	3mJy	0.2mJy	15.0	28Jy	9800
3C48	116MHz	yes	10"	~60km	6mJy	0.85mJy	7.0	71Jy	11200
M33	116MHz	yes	10"	~60km	11mJy	0/85mJy	14.0	diffuse	3800
empty field	213MHz	yes	3"	~120km					

▪ **In progress:**

- Implementation in the LOFAR pipeline system
- Investigation of peeling strategy within selfcal

▪ **Longer term:**

- Incorporate results from other work streams



▪ **Done:**

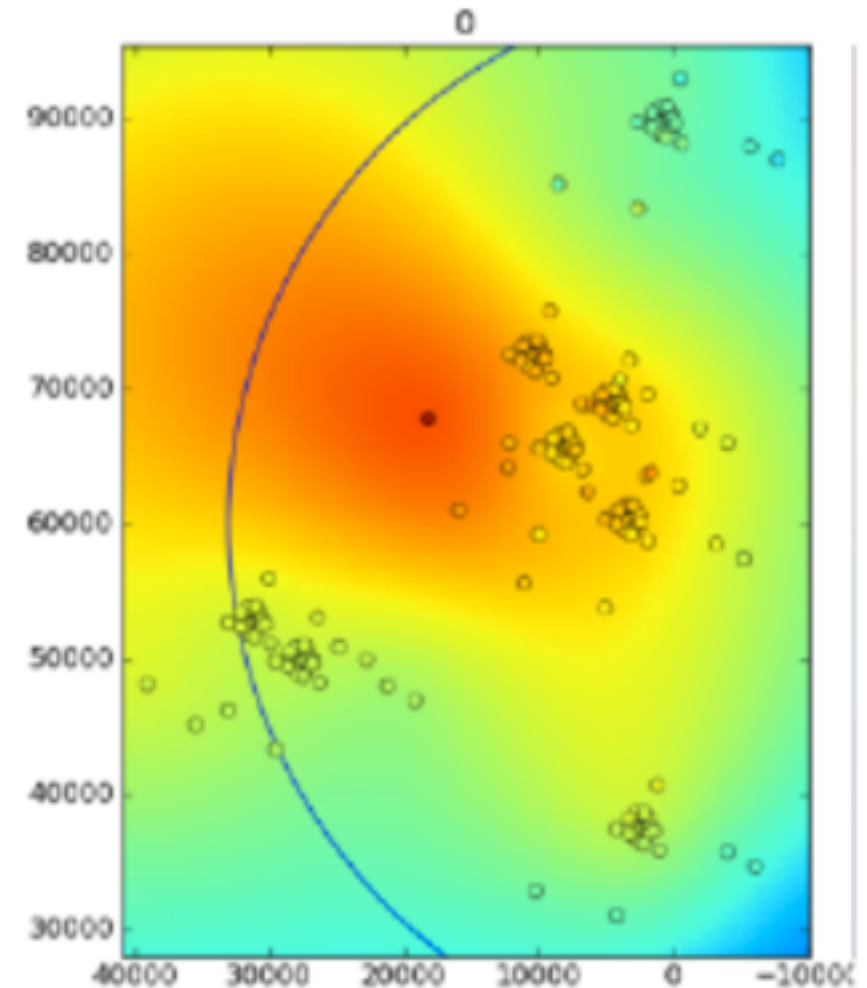
- Proof of concept on MSSS verification field (LBA)
 - peak fluxes increase by up to a factor of ~ 2
 - 50% more sources detected in 30 MHz image at 6σ
- Peeling and TEC fitting scripts work
- Partial results on LBA test obs, HBA
 - Not very encouraging yet

▪ **In progress:**

- HBA Toothbrush observation
- Another LBA test observation
- Tool for handling sky models

▪ **Longer term:**

- Incorporate fast calibration
- Decide whether this strategy is the best...



Imager

Calibration

Selfcal

Ionosphere



Non-directional selfcal
available + characterized (?)

New imager
available + characterized (?)

